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olumbia, SC 29201-1708

MEMORANDUM

SUBJ: Evaluation of Charleston Air Force Base's status under the RCRIS Corrective Action Environmental Indicator Event Codes (CA725 and CA750)
EPA I.D. Number: SC3 570 024 460

FROM: Tim Hornosky, P.G. 6/30/03
RCRA Hydrogeology, Team II
Division of Hydrogeology
Bureau of Land and Waste Management

THRU: Joe B. Bowers, P.G., Section Manager SB 7-2-03
RCRA Hydrogeology, Team II
Division of Hydrogeology
Bureau of Land and Waste Management

THRU: G. Kendal Taylor, P.G., Director /PH for KT 7-2-03
Division of Hydrogeology
Bureau of Land and Waste Management

TO: File #50511

CC: John Litton, P.E., Division of Waste Management
Jamelle H. Ellis, Corrective Action Engineering
Rick Richter, Trident District EQC
Caron Falconer, USEPA Region 4

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of Charleston Air Force Base's status in relation to the following corrective action event code defined in the Resource Conservation and Recovery Information System (RCRA Info):

1. Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the Director of the Division of Hydrogeology is required prior to entering these event codes into the RCRA Info database. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing at the appropriate location within Attachment 1.

FACILITY AND REFERENCE DOCUMENTS

This is the third EI evaluation for Charleston Air Force Base. The first EI evaluation was performed by the U.S. Environmental Protection Agency (USEPA) in September 1998, and recommended an IN for CA725, and a NO for CA 750. This determination reflected the known contamination present at CAFB, and the lack of exposure controls and groundwater control measures at some sites. The CA725 code was re-evaluated in September 2002. At that time, it was determined that human exposures were controlled, and a CA725 YE was entered into RCRIS. The CA750 code was not re-evaluated at that time, and is the subject of this memorandum.

III. FACILITY SUMMARY

CAFB is an Air Mobility Command (AMC) facility, and is located in North Charleston, South Carolina adjacent to Charleston International Airport. The base consists of approximately 3,731 acres of contiguous property. Approximately 8,755 people are assigned to or employed by CAFB. The runways and taxiways of the facility are shared under a joint-use agreement with the Charleston County Aviation Authority. Land use within the base property consists of airfield and mission support, recreational, industrial, medical, administrative and residential. Surrounding land is used for residential, industrial, and commercial purposes. The facility's mission includes transport of personnel and equipment world-wide. Hazardous wastes are generated and stored on site as a result of operation and maintenance of aircraft and related equipment.

CAFB was issued a Resource Conservation and Recovery Act (RCRA) Part B permit on September 30, 1991 by USEPA. The current RCRA Part B permit was issued by the South Carolina Department of Health and Environmental Control on November 14, 1999.

IV. CONCLUSION FOR CA725

A CA 725 YE was entered into RCRA Info on August 26, 2002, and remains valid at this time. Therefore, the current evaluation modifies only the CA750 code. Should additional information come to light in the future regarding the potential for human exposures to contaminated media, the CA725 code may be re-evaluated.

V. CONCLUSION FOR CA750

The Department recommends entering a CA750 YE for CAFB. In the time since the initial CA750 evaluation was performed (September 1998), CAFB has completed investigations and removal actions at several sites, and has instituted interim measures to control groundwater migration. This code may be re-evaluated in the future if deemed necessary by the Department.

VI. SUMMARY OF FOLLOW-UP ACTIONS

Upon finalization of this memorandum the Environmental Indicator Codes for CAFB will be CA725 YE and CA750 YE. These findings are based in part upon continued monitoring and operation of several interim remedial actions currently in operation or under construction at CAFB. These actions are necessary to ensure the control of contaminated groundwater migration. The Department may choose to re-evaluate the CA725 and or CA750 codes for CAFB should conditions change or new information come to light.

Attachment: 1. CA750: Migration of Contaminated Groundwater Under Control

ATTACHMENT 1
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Event Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Charleston Air Force Base
Facility Address: Charleston, South Carolina 29404-5045
Facility EPA ID #: SC3 570 024 460

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

__X__ If yes - check here and continue with #2 below,

____ If no - re-evaluate existing data, or

____ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is groundwater known or reasonably suspected to be "contaminated"[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

__X__ If yes - continue after identifying key contaminants, citing appropriate "levels" and referencing supporting documentation.

____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels" and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Zone 2:

Rationale:

Zone 2 is an area of groundwater contamination underlying 26 separate SWMUs and AOCs. An RFI was conducted for Zone 2 groundwater during 1998. During the 2002 base-wide monitoring period, cis-1,2-dichloroethylene (cis-1,2-DCE) was detected at a maximum concentration of 302 micrograms per liter (ug/L), exceeding its maximum contaminant level (MCL) of 70 ug/L. Tetrachloroethylene (PCE) was detected at a maximum concentration of 165 ug/L, exceeding its MCL of 5.0 ug/L. Trichloroethylene (TCE) was detected at a maximum concentration of 146 ug/L, exceeding its MCL of 5.0 ug/L. Vinyl chloride was detected at a maximum concentration of 16.4 ug/L, exceeding its MCL of 2.0 ug/L. Fuel hydrocarbons are also present at this site, with benzene detected at a maximum concentration of 236 ug/L exceeding its MCL of 5.0 ug/L during the 2002 LTM period.

References:

RFI/CMS Report for Zone 2 and AOC O, Base Tank Farm, Charleston Air Force Base, South Carolina , October 1998

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

Zone 4:

Rationale:

Groundwater at Zone 4 is impacted by chlorinated solvents, primarily trichloroethylene (TCE) and cis-1,1-dichloroethylene (cis-1,2-DCE). These compounds have entered groundwater from several SWMUs and form a plume several acres in size. During 2001, a Phase 2 RFI was performed at Zone 4. TCE was detected at a maximum concentration of 296,000 ug/L. Cis-1,2-DCE was detected at a maximum concentration of 89,000 ug/L.

References:

Phase II RFI Report for Zone 4, Draft Final, August 2002

SWMU 55

Rationale:

SWMU 55 is a former fire training area. Phase 1 and 2 RFIs have indicated that groundwater is contaminated with both chlorinated solvents and petroleum hydrocarbons.

During the base-wide monitoring period from May 2002 through January 2003, five VOCs were reported at levels greater than the appropriate comparison criteria. PCE was detected at a maximum concentration of 59.7 ug/L exceeding its MCL of 5.0 ug/L. TCE was detected at a maximum concentration of 96.6 ug/L, exceeding its MCL of 5.0 ug/L. Vinyl Chloride was detected at a maximum concentration of 3.42 ug/L, exceeding its MCL of 2.0 ug/L.

References:

Phase II RFI Report for SWMU 55, Fire Training Area No. 3, URS/Radian International, June 13, 2001

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

SWMU 68

Rationale:

SWMU 68 is a former landfill which received wastes from 1959 through 1968. Contaminants detected during the Phase 2 RFI included TCE at a maximum concentration of 19.1 ug/L, and vinyl chloride at a concentration of 2.9 ug/L (one detection each above their respective MCLs). During the 2002 base-wide monitoring events, no VOCs were detected above screening criteria (which include MCLs).

References:

Final Phase II RFI Report, SWMU 68 (LF-06 Landfill), March 6, 2002

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

SWMU 69

Rationale:

SWMU 69 is a former landfill. Contaminants detected above MCLs at SWMU 69 during 2002 include TCE (detected at a maximum concentration of 383 ug/L, exceeding its MCL of 5 ug/L), vinyl chloride (detected at a maximum concentration of 7.79 ug/L, exceeding its MCL of 2.0 ug/L), and benzene (detected at a maximum concentration of 6.22 ug/L, exceeding its MCL of 5.0 ug/L).

References:

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

3. Has the migration of contaminated groundwater stabilized such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination?

__X__ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination").

____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination") - skip to #8 and enter "NO" status code, after providing an explanation.

____ If unknown - skip to #8 and enter "IN" status code.

Zone 2:

Rationale:

Twenty-six (26) wells within Zone 2 are sampled quarterly to monitor both contaminant levels and natural attenuation parameters. The most recent annual monitoring report indicates that reductive dechlorination is degrading chlorinated VOCs, particularly in the down-gradient portions of the VOC plume. The report indicates that most contaminant concentrations are below MCLs at the down-gradient boundary of Zone 2, and concludes that natural attenuation processes are effectively degrading residual contaminants in groundwater.

References:

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

Zone 4:

Rationale:

An interim measure (IM) groundwater extraction and treatment system was installed at Zone 4 to intercept contaminated groundwater which had been discharging to a stormwater ditch. The concrete lined ditch was also repaired to prevent discharge of contaminated groundwater. Contaminated groundwater is

[2] "Existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

removed from the subsurface through a network of extraction wells and is then treated by a shallow tray air stripper before being discharged to a POTW via the sanitary sewer system.

References:

Interim Measure Construction Completion Report for Zone 4 (SS-42) Ditch Interim Measure, Charleston Air Force Base, South Carolina, Draft Final, 25 November, 2002

SWMU 55:

Rationale:

An interim measure (IM) air-sparge/soil vapor extraction (AS/SVE) system was installed during 2001 and 2002 with the objective of controlling migration of groundwater contaminated above MCLs. The system began operation on July 24, 2002. This action has formed a barrier to further migration of VOCs from both fuel and solvent sources. Off-base sampling of sediment and surface water down-gradient of the AS/SVE curtains, indicates that contaminant levels are below media clean-up standards (MCLs for groundwater) in the area immediately downgradient of the AS/SVE system. Off-base sampling conducted in September 2002 verified that contaminants are not present in groundwater downgradient of the facility boundary.

References:

SWMU 55 AS/SVE System Interim Measure Quarterly Report, August – October 2002, (IT Corporation, February 10, 2003)

SWMU 55 AS/SVE System Interim Measure Quarterly Report, November 2002-January 2003, (IT Corporation, March 28, 2003)

SWMU 68:

Rationale:

Chlorinated hydrocarbon contamination detected at SWMU 68 is limited to the southeastern corner of the site. The landfill was closed in 1968 and has not received new wastes since that time. The levels of TCE and vinyl chloride detected at the site boundary are above the MCLs, but do not suggest the presence of a source area likely to contribute to contamination of additional volumes of groundwater. Currently an engineered cover is being constructed at SWMU 68 as an interim measure. The cover is designed to prevent exposure to buried waste, while also reducing the rate of infiltration of rainwater. By reducing the infiltration of water into the landfill, the cap is expected to reduce the contribution of contaminants to groundwater, resulting in reduction of concentrations in groundwater.

References:

Final Phase II RFI Report, SWMU 68 (LF-06 Landfill), March 6, 2002

Draft Final Work Plan for Interim Measure Installation of Landfill Cover at SWMU 68 (LF-06), Charleston Air Force Base, South Carolina, 26 February, 2003

SWMU 69:

Rationale:

LTM sampling began at SWMU 69 in 1998. Since that time, concentrations of benzene in groundwater have remained fairly consistent, with a slight decrease toward the end of 2002 in monitoring wells 69-02-02, and 69-02-06B. Overall, contaminant levels fluctuate near the MCLs for benzene in monitoring well 69-02-6A, and vinyl chloride in monitoring well 69-02-6B. No other contaminants are consistently present above MCLs. It does not appear that there is a sufficient contaminant mass present at SWMU 69 to result in further migration of contaminated groundwater.

Reference:

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

4. Does "contaminated "groundwater discharge into surface water bodies?

__X__ If yes - continue after identifying potentially affected surface water bodies.

____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

____ If unknown - skip to #8 and enter "IN" status code.

Zone 4:

Rationale:

Contaminated groundwater was found to be discharging to a concrete lined ditch during the Phase 2 RCRA Facility Investigation. CAFB repaired the concrete lining and installed a groundwater pump and treat system during 2001 in order to mitigate the discharge of contaminated groundwater. The system began operation in October 2001. Prior to these actions, the concentration of TCE in surface water was 1280 ug/L. Following implementation, the concentration of TCE in surface water was reduced to 0.136 ug/L. Contaminated groundwater is considered for the purposes of this review to be discharging to surface water.

References:

Phase II RFI Report for Zone 4, Draft Final, August 29, 2002
Interim Measure Construction Completion Report for Zone 4 (ss-42) Ditch Interim Measure, Charleston Air Force Base, South Carolina, November 25, 2002

SWMU 55:

Rationale:

Groundwater from SWMU 55 discharges to an unnamed stream along the southern boundary of the site. This stream is tributary to Filbin Creek, which flows to the Cooper River. Surface water and sediment samples were collected from this stream, at locations up-stream of, coincident with, and down-stream of the contaminant plume. The sediment sample from the up-stream location contained 2.0 ug/Kg of trichloroethene (TCE). No other site contaminants were detected in sediments. Surface water samples contained concentrations of cis-1,2-dichloroethene (cis-1,2-DCE) and TCE of 1.0 ug/L or less.

References:

Solid Waste Management Unit 55 Phase II RFI Report Addendum, Off-Base Groundwater Investigation, February 6, 2003

SWMU 68:

Rationale:

Surface water samples were collected during the SWMU 68 Phase 2 RFI. Three constituents were detected in surface water sample SW03. SW03 was collected from a ditch adjacent to the southeast corner of SWMU 68. This ditch intermittently conveys runoff to Golf Course Creek, which is tributary to Popperdam Creek, which flows to the Ashley River. The SW03 sample contained TCE (1.77 ug/L), cis-1,2-DCE (3.89ug/L) and chlorobenzene (1.07 ug/L). These contaminants were also detected in groundwater samples from monitoring wells MW6-10 and MW6-11 which are the closest wells to the ditch.

References:

Final Phase II RFI Report, SWMU 68 (LF-06 Landfill), March 6, 2002

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level" and there are no other conditions (e.g., the nature and number of discharging contaminants, or environmental setting) which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

___ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level" the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) providing a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

__X__ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," providing the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identifying if there is evidence that the amount of discharging contaminants is increasing.

____ If unknown – enter "IN" status code in #8.

Zone 4 (Insignificant):

Rationale:

Although VOCs are present in significant concentrations in groundwater, the discharge of contaminated groundwater is limited by engineered controls. An interim measure was implemented at Zone 4 which consisted of reconstruction of the concrete lining of the stormwater drainage ditch to prevent groundwater discharge, and installation of a groundwater extraction and treatment system. The extraction system is designed to intercept contaminated groundwater which previously discharged to surface water. This water is treated by an air stripper to

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

remove the contaminants (VOCs) before being discharged to the sanitary sewer system. At the level in surface water measured following completion of the IM (0.136 ug/L TCE), the discharge to surface water is considered to be insignificant. This is further justified by the volatile nature of the contaminant in question, the lack of a viable habitat presented by the concrete lined ditch, and the intermittent presence of surface water in the ditch.

References:

Interim Measure Construction Completion Report for Zone 4 (ss-42) Ditch Interim Measure, Charleston Air Force Base, South Carolina, November 25, 2002

SWU 55 (Potentially significant):

Rationale:

Monitoring well MW-P-11S is located approximately 50 feet up-gradient of the surface water body. This is the most appropriate location from which to assess groundwater discharging to surface water as defined in the E.I. guidance. During the most recent quarterly monitoring event (January 2003), groundwater from MW-P-11S contained 73.5 ug/L of TCE. This is the maximum level of TCE detected in this well, and exceeds 10 times the appropriate groundwater level as defined in the E.I. guidance. This monitoring well was sampled twice previously. In May 2001, it contained 32.9 ug/L of TCE. In October 2002, it contained 0.8 ug/L of TCE. The data indicate that there is some fluctuation of the level of TCE in this well, but do not suggest a trend. Monitoring data indicate that no other contaminants are discharging to groundwater at levels greater than 10 times their appropriate groundwater level. Preliminary data from the March 2003 sampling event indicate a TCE level of 51.3 ug/L, which is consistent with previous results.

Groundwater monitoring at SWMU 55 has demonstrated that concentrations are not increasing, and none of the contaminants are discharging to surface water in concentrations greater than 100 times their appropriate groundwater levels (MCLs).

Reference:

SWMU 55 (FT-03) Air Sparge/Soil Vapor Extraction System Interim Measure Quarterly Report, November 2002 – January 2003, Charleston Air Force Base, March 28, 2003

SWMU 55 (FT-03) Air Sparge/Soil Vapor Extraction System Interim Measure Quarterly Report, August - October 2002, Charleston Air Force Base, February 10, 2003

SWMU 68 (Insignificant):

Rationale:

Discharge of contaminated groundwater from SWMU 68 is likely to be insignificant. The only contaminants measured above MCLs in groundwater adjacent to the surface water discharge area are the volatile organic compounds

(VOCs) TCE and vinyl chloride. Neither of these compounds was present at a level exceeding ten times its MCL. A low permeability cover currently under construction at SWMU 68 is expected to further reduce the concentration of contaminants discharging to surface water. In addition, these compounds tend to volatilize, and are not persistent in surface water.

The Phase 2 RFI conducted at SWMU 68 included Baseline Human Health and Ecological Risk Assessments (BRA). Due to the intermittent nature of surface water in the ditch, it was determined not to represent an aquatic habitat. The BRA concluded that there are no unacceptable risks from exposure to surface water, either to human or ecological receptors.

6. Can the discharge of "contaminated" groundwater into surface water be shown to be "currently acceptable" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

__X__ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

____ If unknown - skip to 8 and enter "IN" status code.

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4 Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

5 The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

SWMU 55

Rationale:

Groundwater from SWMU 55 discharges to an unnamed stream along the southern boundary of the site. Surface water and sediment samples were collected from this stream on September 11, 2002, at locations up-stream of, coincident with, and down-stream of the contaminant plume. Surface water samples contained concentrations of cis-1,2-dichloroethene (cis-1,2-DCE) and TCE of 1.0 ug/L or less. These levels are below the South Carolina Water Quality Numeric Criteria for the Protection of Aquatic Life and Human Health (2.7 ug/L for TCE for Human consumption of water and organism), as well as the maximum contaminant levels (MCLs) of 70 ug/L for cis-1,2-DCE and 5 ug/L for TCE. The MCLs, established by the Safe Drinking Water Act, are the applicable standards for groundwater at Charleston Air Force Base.

These results are representative of conditions less than two months following the implementation of the interim measure AS/SVE system. It is expected that the continued operation of this system will serve to reduce or eliminate any further contribution of contaminated groundwater to surface water.

References:

Solid Waste Management Unit 55 Phase II RFI Report Addendum, Off-Base Groundwater Investigation, February 6, 2003

7. Will groundwater monitoring / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

X If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

____ If no - enter "NO" status code in #8.

____ If unknown - enter "IN" status code in #8.

Rationale:

A base-wide groundwater monitoring program has been established at Charleston Air Force Base. The program incorporates monitoring of all the SWMUs and groundwater "Zones" described in this E.I. 750 evaluation.

26 wells are sampled quarterly at Zone 2. The samples are analyzed for VOCs, SVOCs, purgeable and extractable total petroleum hydrocarbons (TPHp and TPHe), organochlorine pesticides, polychlorinated biphenyls (PCBs), methane, metals, and sulfate. Not all wells are analyzed for all parameters. Parameters are selected based on constituents previously detected or likely to be detected in a well given its location.

At Zone 4, 12 wells are sampled quarterly for sulfate, methane, TPHe, TPHp, VOCs, SVOCs and metals. Zone 4 is also undergoing an additional IM with the intent of reducing groundwater contamination to below MCLs by 2007. Five new observation wells and five existing monitoring wells will be monitored in conjunction with this effort. Although the monitoring schedule allows flexibility depending on preliminary results, six monitoring events are planned during the first year of the remedial effort.

The base-wide monitoring program examines data from eight (8) wells at SWMU 55 on a quarterly basis. Five (5) of these wells are within the source area, and three (3) are at the down-gradient edge of the plume, which is adjacent to the base boundary. Additional monitoring is also conducted in conjunction with the operation of the interim measure (IM) at SWMU 55. Data from fourteen (14) monitoring wells are collected quarterly as part of this program. The most recent quarterly IM monitoring took place on January 20 and 21, 2003.

A network of seventeen (17) wells were installed at SWMU 68, which monitor both the upper and lower intervals of the shallow aquifer. Four (4) of these wells

were sampled during the 2002 base-wide monitoring effort. An engineered cover is currently being constructed at SWMU 68 as an interim measure (IM). Several wells have been abandoned as a result of this construction. Following completion of the construction, the wells will be reinstalled at locations agreed upon by CAFB and the Department. A monitoring program will be scoped and implemented based on a review of the accumulated data from the Phase I and Phase II RFIs, and the base-wide monitoring program.

The seven (7) wells at SWMU 69 will continue to be monitored quarterly for VOCs, SVOCs, organochlorine pesticides, PCBs, and metals. Additionally, the wells will be sampled annually for methane and sulfate as part of a natural attenuation evaluation.

References:

2002 RCRA Long-Term Monitoring Program Annual Report, May 19, 2003

SWMU 55 (FT-03) Air Sparge/Soil Vapor Extraction System Interim Measure Quarterly Report, November 2002 – January 2003, Charleston Air Force Base, March 28, 2003

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at Charleston Air Force Base, EPA ID #SC3 570 024 460, located at Charleston Air Force Base, South Carolina 29404-4827. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater."

This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

____ IN - More information is needed to make a determination.

Completed by: (signature) _____ Date: 6/30/03
Tim Hornosky, P.G.
Hydrogeologist

Supervisor: (signature) _____ Date: 7-3-03
Joe Bowers, P.G.
Manager, RCRA Hydrogeology Team II

(signature) John R. Kelly for _____ Date: 7-2-03
G. Kendal Taylor, P.G.
Director, Division of Hydrogeology

Location where References may be found:

1. South Carolina Department of Health and Environmental Control, Columbia, South Carolina 29201
2. Charleston Air Force Base, Charleston, South Carolina 29404-4827

Contact telephone and e-mail numbers:

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